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1979 PESTICIDE USE ON VEGETABLES IN THE NORTHEAST
A PRELIMINARY REPORT

by

Walter L. Ferguson
and
Iris E. McCalla

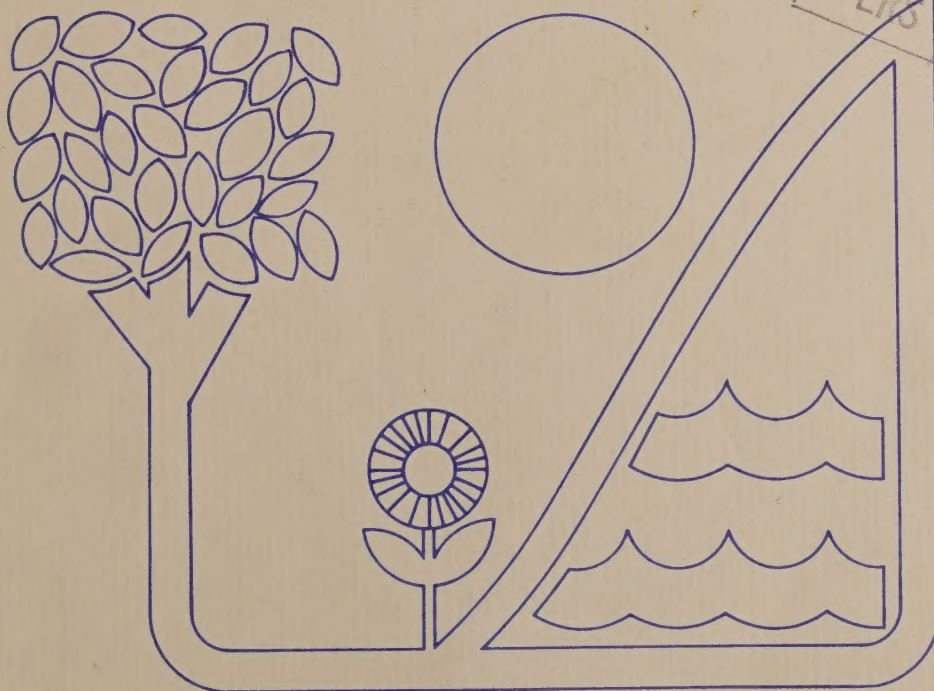
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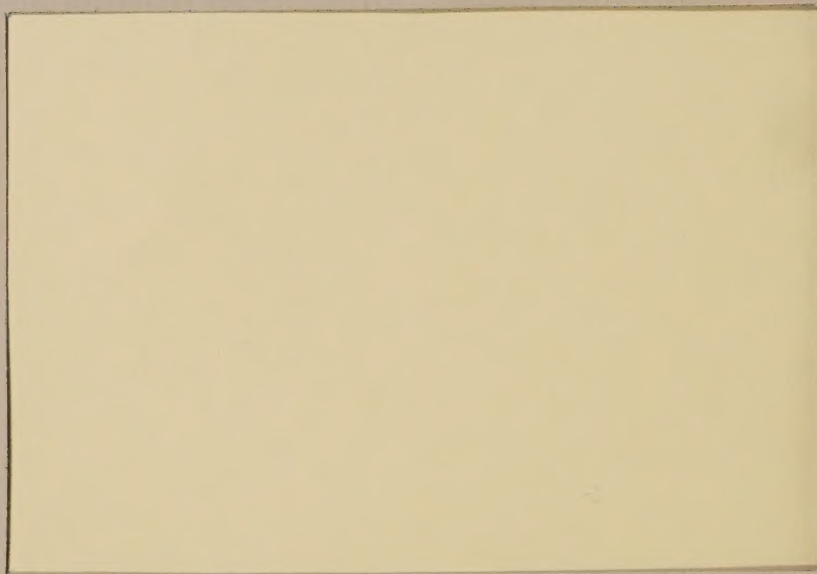
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1979 PESTICIDE USE ON VEGETABLES IN THE NORTHEAST, A PRELIMINARY REPORT.

By Walter L. Ferguson and Iris E. McCalla; Natural Resource Economics Division,
Economic Research Service, U.S. Department of Agriculture, Washington,
D.C. 20250; December 1981.

ERS Staff Report No. AGES811218

ABSTRACT

According to the U.S. Department of Agriculture's 1979 Vegetable Pesticide Survey, approximately 1.3 million pounds of pesticides were used to control weeds, insects, diseases and nematodes on 10 vegetable crops in New York and New Jersey. The 10 vegetable crops include cabbage, carrots, celery, cucumbers, green peas, lettuce, onions, snap beans, sweet corn, and tomatoes. Approximately 825,000 acre-treatments were made ranging from 262,000 for sweet corn to 700 for carrots.

Key Words: Pesticides, herbicides, fungicides, insecticides, nematicides, tank-mixes, acres treated, application rates, vegetables, Northeast.

* * * * *

* This paper was prepared for limited distribution to the research community *
* outside the U.S. Department of Agriculture. The data in this report are *
* preliminary, and consequently subject to change. The data have not been *
* subjected to statistical reliability testing, but will be tested prior *
* to finalization and publication. The final tabulation of the data will *
* provide information for six regions which will include data for 18 States. *
* The final tabulations are scheduled for publication in early 1982. The *
* data are being released at this time to allow the agricultural community *
* an opportunity to comment on the data. If you have any comments, please *
* send them by January 31, 1982 to: *
* *
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* *
* Use of company names or products in this report is for identification *
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* *
* * * * *

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The specialists included Jerry Heath of New York; and John A. Meade, Stewart E. Race, and John K. Springer of New Jersey. Victoria N. Valentine, Beverly A. Herath, and Andrea E. Lunsford typed the preliminary and final drafts of the manuscript.

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1979 PESTICIDE USE ON VEGETABLES IN THE NORTHEAST, A PRELIMINARY REPORT

INTRODUCTION

In this report, patterns of pesticide use in the Northeast in 1979 are discussed for cabbage, carrots, celery, cucumbers, green peas, lettuce, onions, snap beans, sweet corn, and tomatoes. Survey data were collected on quantities of pesticides used, acres treated, acre-treatments, number of applications, seasonal rates, and rates per acre-treatment. This report provides information useful to policymakers, researchers, extension specialists, and industry personnel. Because vegetables are highly susceptible to weeds, insects, diseases, and other pest damage, there is a continuing need for information on pesticides used in vegetable production. Regulations on the use of pesticides and review of registrations by the Environmental Protection Agency create the need for accurate, detailed information for economic studies.

A major factor affecting the quantity of pesticides used is the number of acres planted. The year surveyed, 1979, can be viewed as a typical year for the 10 crops surveyed, with 193,300 acres planted in 1979 versus an average of 191,500 acres for the period 1978-80 (Table 1). However, the number of planted acres is only one of several factors affecting pesticide usage. Weather conditions, pest infestations, and pest resistance to pesticides affect pesticide rates and the number of applications per season.

Planted acreage of the 10 crops surveyed in 1979 ranged from about 63,000 acres for snap beans to about 600 acres for celery. Of the 193,300 total acreage of the 10 vegetables, about 92,000 acres were planted for the processing markets.

As pests not only affect yield but also quality, the appearance of the product has a considerable impact on market price. Thus, for these fresh market and processing crops, pest control is especially important.

Table 1. Acres planted in 1979 compared with 1978-80 average, 10 vegetables, Northeast a/

Crop	Fresh market			Processing market			Fresh and processing market	
							3-year	
	1978	1979	1980	1978	1979	1980	1979	average
-----1,000 acres-----								
Cabbage	13.1	14.4	13.8	4.2	3.7	3.7	18.1	17.6
Carrots	--	--	--	2.0	2.0	2.2	2.0	2.1
Celery	.7	.6	.8	--	--	--	.6	.7
Cucumbers	4.3	4.7	5.5	1.7	1.5	1.4	6.2	6.4
Green peas	--	--	--	5.8	6.3	6.2	6.3	6.1
Lettuce	7.4	7.5	7.1	--	--	--	7.5	7.3
Onions	15.2	15.7	15.4	--	--	--	15.7	15.4
Snap beans	13.6	14.0	15.1	52.3	49.2	49.1	63.2	64.4
Sweet corn	33.6	34.5	33.0	22.4	21.6	17.9	56.1	54.3
Tomatoes	10.1	10.3	10.0	8.3	7.3	5.4	17.6	17.1
10 crops	98.0	101.7	100.7	96.7	91.6	85.9	193.3	191.5

a/ "Vegetables, 1980 Annual Summary," U.S. Department of Agriculture, ESS, Vg 1-2(80), December 1980.

METHODOLOGY

As part of a national survey of pesticide use on vegetables, Northeast vegetable growers were personally interviewed to collect data on specific pesticides used, acres treated, methods of application, and target pests controlled in 1979. Approximately 500 growers were interviewed in New York and 400 in New Jersey.

A stratified random sample design was used to select growers. Data were expanded for individual farms in the survey to reflect all farms by multiplying the sample data by the inverse of the sample ratio for the stratum. The pesticide use data for each crop were then adjusted by the ratio of the number of acres grown in the State to the number of expanded sample acres for each crop grown.

INTERPRETING THE DATA

Pesticides are grouped into the following categories: (1) herbicides (used to kill plants or inhibit their growth), (2) insecticides (used to kill or inhibit insects), (3) fungicides (used to control diseases by killing or inhibiting fungi), and (4) nematicides (used to kill or inhibit nematodes and other organisms in the soil).

The term, "acres treated," is used to identify acres receiving one or more applications of a specific pesticide. Acres treated are not additive because two or more different specific ingredients may have been used on the same acre. Therefore, summing them could result in double counting. For this reason, the sums of acres treated are not shown in Tables 5 through 19.

"Acre-treatments" are the number of acres treated one time by a specific pesticide. The number of applications per season was derived by dividing the acre-treatments by the acres treated for each specific pesticide material.

Single application and annual rates are estimated for specific active ingredients. Annual rates include the average rate for all seasons. The single application rate is derived by dividing the total active ingredients of a specific pesticide by the number of acre-treatments; the annual rate is derived by dividing the total active ingredients by the number of acres treated.

Acres treated and acre-treatments for Bacillus thuringiensis, a bacteria, are included in the insecticide category. The rates and quantities applied are not reported since application rates are expressed in terms of spores per gram rather than in pounds of active ingredient.

The rate per application and number of applications for specific pesticides may vary considerably from published guidelines for a number of reasons. For example, published rates are generally broadcast rates whereas a number of the rates reported in the survey were band or in-furrow rates which are one-fourth to one-third that of the broadcast rates. Also, young vegetable plants require considerably lower dosage rates of insecticides and fungicides than do older plants. For insect control, vegetables grown on sandy soils generally require lower rates of soil insecticides than the same vegetables grown on organic soils.

Weather plays an important role in the use of fungicides as low moisture years generally require lower rates and fewer applications than high moisture years. Some varieties of vegetables have greater resistance to specific diseases and are less attractive to insects than other varieties, requiring lower rates and fewer applications. Also, resistance of pests to pesticides plays an important role in determining rates and number of applications. Rates are generally lower when two or more pesticides with the same spectrum of control are applied in tank-mix applications than when those respective pesticides are applied as single ingredients.

RESULTS

In 1979, Northeast growers planted approximately 193,300 acres of cabbage, carrots, celery, cucumbers, green peas, lettuce, onions, snap beans, sweet corn, and tomatoes (Table 2). New York growers accounted for about 150,900 or nearly 80 percent of the total planted acreage. About 92,000 or 47 percent of the acreage in the two States was planted for the processing market, and about 87,000 or 45 percent for the summer fresh market. New York snap bean (56,000 acres), sweet corn (44,000 acres), and onion growers (15,000 acres) accounted for about 60 percent of the total 10 crop planted acreage for the two States.

The growers used about 825,000 acre-treatments of pesticides on the 10 vegetables, with New York growers accounting for about 70 percent of the total (Table 3). Four vegetables accounted for 80 percent of total acre-treatments; they included onions (32 percent), sweet corn (20 percent), tomatoes (15 percent), and cabbage (14 percent). Of the 622,000 single ingredient acre-treatments, insecticides accounted for 52 percent, herbicides 28 percent, fungicides 18 percent, and other controls 2 percent. Tank-mix applications accounted for about 205,000 acre-treatments or about 25 percent of the 825,000 total acre-treatments.

The growers applied about 1.3 million pounds of active ingredients (a.i.) of all pesticides to the 10 vegetable crops (Table 4). The four vegetables comprising about 80 percent of the quantity applied included onions (46 percent), sweet corn (13 percent), snap beans (12 percent), and tomatoes (12 percent). Mineral spirits are not included in the total quantity applied. An estimated 22,340 gallons of mineral spirits were sprayed on 444 acres of carrots in New York.

Of the total quantity of pesticides applied to the 10 crops, two or more active ingredients applied in tank-mixes accounted for about 470,000 pounds (a.i.)

Table 2. Vegetables: Acres planted, fresh and processing markets, Northeast, 1979 a/

Crop	: Processing	:	Fresh market			: Total, fresh
	: market	:	Spring	Summer	Fall	: Total :and processing
----- 1,000 acres -----						
<u>Cabbage</u>						
New York	3.7	--	1.8	7.6	9.4	13.1
New Jersey	--	.9	2.9	1.2	5.0	5.0
Total	3.7	.9	4.7	8.8	14.4	18.1
<u>Carrots</u>						
New York	2.0	--	--	--	--	2.0
<u>Celery</u>						
New York	--	--	.5	.1	.6	.6
<u>Cucumbers b/</u>						
New York	--	--	2.9	--	2.9	2.9
New Jersey	1.5	--	1.8	--	1.8	3.3
Total	1.5	--	4.7	--	4.7	6.2
<u>Green peas</u>						
New York	6.3	--	--	--	--	6.3
<u>Lettuce</u>						
New York	--	--	4.0	--	4.0	4.0
New Jersey	--	1.7	.7	1.1	3.5	3.5
Total	--	1.7	4.7	1.1	7.5	7.5
<u>Onions</u>						
New York	--	--	14.9	--	14.9	14.9
New Jersey	--	--	.8	--	.8	.8
Total	--	--	15.7	--	15.7	15.7
<u>Snap beans b/</u>						
New York	49.2	--	6.6	--	6.6	55.8
New Jersey	--	1.2	5.1	1.1	7.4	7.4
Total	49.2	1.2	11.7	1.1	14.0	63.2
<u>Sweet corn</u>						
New York	21.6	--	22.7	--	22.7	44.3
New Jersey	--	--	11.8	--	11.8	11.8
Total	21.6	--	34.5	--	34.5	56.1
<u>Tomatoes</u>						
New York	--	--	7.0	--	7.0	7.0
New Jersey	7.3	--	3.3	--	3.3	10.6
Total	7.3	--	10.3	--	10.3	17.6
<u>10 crops</u>						
New York	82.8	--	60.4	7.7	68.1	150.9
New Jersey	8.8	3.8	26.4	3.4	33.6	42.4
Total	91.6	3.8	86.8	11.1	101.7	193.3

a/ "Vegetables, 1980 Annual Summary," U.S. Department of Agriculture, ESS, Vg 1-2(80), December 1980.

b/ Cucumbers and snap beans grown for the fresh market were not included in the 1979 Vegetable Pesticide Survey.

Table 3. Vegetables: Acre-treatments of pesticides by crop, single ingredient and tank-mix applications, Northeast, 1979 a/

Crop	Single ingredient applications				Tank-mix applications		Single and tank-mix applications		
	Herbicides	Insecticides	Fungicides	Other	applied	Total d/	New York	New Jersey	Total d/
----- 1,000 acre-treatments -----									
Cabbage	10.6	75.8	9.3	-	17.6	113.3	84.8	28.5	113.3
Carrots	.9 <u>c/</u>	1.2	<u>b/</u>	-	1.2	3.3	3.3 <u>c/</u>	-	3.3
Celery	3.8	10.6	7.6	-	<u>b/</u>	22.0	22.0	-	22.0
Cucumbers	.3	.9	.8	-	1.5	3.5	-	3.5	3.5
Green peas	5.0	-	-	-	<u>b/</u>	5.0	5.0	-	5.0
Lettuce	5.4	28.9	2.4	-	14.7	51.3	16.7	34.6	51.3
Onions	56.6	62.3	43.1	8.7	91.1	261.8	257.8	3.9	261.7
Snap beans	55.8	4.2	9.7	-	5.8	75.5	75.5	-	75.5
Sweet corn	23.9	106.6	<u>b/</u>	-	36.0	166.6	95.2	71.4	166.6
Tomatoes	10.7	36.8	39.0	.9	37.3	124.7	27.5	97.2	124.7
10 crops <u>d/</u>	173.0	327.3	111.9	9.6	205.2	827.0	587.8	239.1	826.9

- = none reported in survey sample.

a/ 1979 Vegetable Pesticide Survey, USDA, ESCS, Natural Resource Economics Division.

b/ Less than 50 acre-treatments.

c/ Excludes an estimated 22,340 gallons of mineral spirits sprayed on 444 acres.

d/ Minor differences in totals due to rounding.

Table 4. Vegetables: Quantities of pesticides used by crop, single ingredient and tank-mix applications, Northeast, 1979 a/

Crop	Single ingredient applications				: Tank-mix : appli- : cations	: Total : d/	Single and tank-mix applications		
	Herbi- : cides	Insecti- : cides	Fungi- : cides	Other			By State		
							New : York	New : Jersey	Total : d/
----- 1,000 pounds (a.i.) -----									
Cabbage	28.8	34.0	12.4	-	22.3	97.5	59.3	38.1	97.4
Carrots	.7	.7	<u>b/</u>	-	2.3	3.7	3.7 <u>c/</u>	-	3.7
Celery	4.1	4.4	8.4	-	15.0	31.9	31.9	-	31.9
Cucumbers	.8	.5	1.6	-	8.2	11.1	-	11.1	11.1
Green peas	5.2	-	-	-	<u>b/</u>	5.2	5.3	-	5.3
Lettuce	18.6	15.5	3.6	-	32.2	69.9	27.0	43.0	70.0
Onions	243.4	37.4	85.5	13.4	229.1	608.8	600.5	8.3	608.8
Snap beans	128.5	5.4	5.4	-	20.6	159.9	159.9	-	159.9
Sweet corn	32.3	64.2	<u>b/</u>	-	79.1	175.7	94.4	81.4	175.8
Tomatoes	9.2	20.6	60.3	1.1	62.7	153.9	25.5	128.3	153.8
10 crops	471.6	182.7	177.2	14.5	471.5	1,317.6	1,007.5	310.2	1,317.7

- = none reported in survey sample.

a/ "1979 Vegetable Pesticide Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Less than 50 pounds (a.i.).

c/ Excludes an estimated 22,340 gallons of mineral spirits sprayed on 444 acres.

d/ Minor differences in totals due to rounding.

or about 35 percent. Nearly 50 percent of the tank-mixed active ingredients were applied to onions.

PESTICIDE USE BY CROP

In the following sections, the major pesticides used by crop are discussed along with the primary pests controlled by these pesticides. Patterns of pesticide uses discussed include acres treated, acre-treatments, times applied, rates per application, and annual rates by specific ingredient applied alone and in tank-mixes.

Cabbage

In 1979, approximately 18,000 acres of cabbage were planted in the Northeast, about 80 percent for the fresh market and the remainder for the processing market. New York growers accounted for about 65 percent of the region's fresh market acreage and all of the processing market acreage. New York and New Jersey growers used about 97,000 pounds (a.i.) of all pesticides for nearly 115,000 acre-treatments (Tables 5 and 6).

In New York, trifluralin comprised 85 percent of the approximately 7,500 herbicide acre-treatments, and nitrofen accounted for most of the remaining treatments. In New Jersey, DCPA accounted for 75 percent of the 3,100 acre-treatments and trifluralin accounted for most of the remaining treatments. Trifluralin and DCPA were used for controlling grasses including barnyardgrass, crabgrass, and green and yellow foxtail. Nitrofen was used for controlling broadleaf weeds such as pigweed, lambsquarters, ragweed and purslane.

Major insects affecting cabbage include cabbage loopers, imported cabbage worms, and flea beetles. In New York, methamidophos and parathion accounted for about 30 percent of the acre-treatments and 55 percent of the active ingredients applied as single applications. New Jersey growers used methomyl

Table 5. Cabbage: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New York, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments:	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Nitrofen	988	995	1.0	2.1	2.1	2,092
Trifluralin	6,403	6,405	1.0	.7	.7	4,792
Other	-	118	-	4.0	-	478
Total	-	7,518	-	1.0	-	7,362
<u>Insecticides</u>						
Azinphos-methyl	1,021	2,861	2.8	.5	1.4	1,441
<u>Bacillus</u>						
<u>thuringiensis</u> d/	5,424	20,130	3.7	-	-	-
Diazinon	1,755	2,263	1.3	.7	1.0	1,672
Endosulfan	3,069	4,962	1.6	.7	1.2	3,621
Methomyl	1,631	4,592	2.8	.6	1.7	2,751
Meta-systox	2,084	3,260	1.6	.3	.4	898
Methamidophos	4,360	9,001	2.1	1.0	2.1	9,186
Parathion	3,925	9,755	2.5	.6	1.5	6,049
Mevinphos	1,755	2,706	1.5	.4	.6	998
Other	-	1,074	-	.9	-	922
Total	-	60,604	-	.5	-	27,538
<u>Fungicides</u>						
Chlorothalonil	1,220	3,394	2.8	1.0	2.7	3,280
Copper hydroxide	728	1,430	2.0	1.3	2.5	1,840
Maneb	1,613	3,294	2.0	1.7	3.5	5,575
Other	-	96	-	1.0	-	91
Total	-	8,214	-	1.3	-	10,786
<u>Tank mixtures</u>						
Azinphos-methyl	691	1,961	2.8	.2	.7	452
+ parathion				.5	1.4	981
Azinphos-methyl						
+ fungicides						
+ insecticides	203	330	1.6	1.9	3.1	625
<u>Bacillus thuringiensis</u>						
+ fungicides						
+ insecticides	696	825	1.2	2.0	2.4	1,653
Chlorothalonil						
+ insecticides	572	572	1.0	2.2	2.2	1,235
Copper hydroxide	213	669	3.1	1.4	4.4	936
+ sulfur				.8	2.5	534

-- continued

Table 5. Cabbage: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New York, 1979 a/ b/ --continued

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Tank mixtures (cont'd)</u>						
Endosulfan	1,157	2,034	1.8	0.7	1.2	1,361
+ parathion				.8	1.4	1,627
Maneb	286	658	2.3	1.6	3.7	1,052
+ methamidophos				1.0	2.3	658
+ parathion				.5	1.1	329
Methomyl						
+ fungicides						
+ insecticides	165	584	3.5	1.6	5.7	948
Other	-	877	-	1.4	-	1,272
Total	-	8,510	-	1.6	-	13,663
TOTAL PESTICIDES	-	84,846	-	.7	-	59,349

- a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.
- b/ In 1979, 13,100 acres planted: 3,700 acres for the processing market and 9,400 acres for the fresh market: Summer - 1,800 acres and Fall - 7,600 acres (Table 2).
- c/ Acres treated sums in this column not derived for "other" and "totals" because two or more materials may have been used on the same acre resulting in double counting.
- d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

Table 6. Cabbage: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New Jersey, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
DCPA	1,703	2,318	1.4	8.7	11.8	20,087
Trifluralin	478	478	1.0	.6	.6	267
Other	-	312	-	3.4	-	1,047
Total	-	3,108	-	6.9	-	21,401
<u>Insecticides</u>						
<u>Bacillus</u>						
<u>thuringiensis</u> d/	2,119	3,937	1.9	-	-	-
Fonofos	280	280	1.0	1.7	1.7	467
Endosulfan	130	507	3.9	.9	3.4	440
Methomyl	1,781	7,734	4.3	.5	2.3	4,041
Methamidophos	358	1,420	4.0	.6	2.3	812
Mevinphos	146	379	2.6	.3	.7	99
Other	-	923	-	.7	-	641
Total	-	15,180	-	.4	-	6,500
<u>Fungicides</u>						
Chlorothalonil	451	672	1.5	1.3	2.0	890
Zinab	226	452	2.0	1.5	3.0	679
Other	-	4	-	.4	-	2
Total	-	1,128	-	1.4	-	1,571
<u>Tank mixtures</u>						
<u>Bacillus thuringiensis</u>						
+ fungicides						
+ insecticides	2,380	7,972	3.3	.7	2.4	5,716
DCPA	208	208	1.0	6.0	6.0	1,247
+ nitrofen				4.0	4.0	832
Azinphos-methyl	138	138	1.0	.5	.5	69
+ meta-systox				.3	.3	39
Other	-	788	-	.9	-	703
Total	-	9,106	-	.9	-	8,606
TOTAL PESTICIDES	-	28,522	-	1.3	-	38,078

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 5,000 acres planted for the fresh market: Spring - 900 acres, Summer - 2,900 acres, and Fall - 1,200 acres (Table 2).

c/ Acres treated sums in this column not derived for "other" and "totals" because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

in about 50 percent of the 15,200 single ingredient acre-treatments. Bacillus thuringiensis was used in about 25 percent of the single ingredient acre-treatments and in nearly 90 percent of the tank-mix treatments.

Major cabbage diseases include downy mildew, Alternaria, blackleg, and black rot. Chlorothalonil and maneb accounted for about 80 percent of the total fungicides used in both States.

Tank-mixes accounted for about 10 percent of the total acre-treatments in New York and nearly 30 percent of the total in New Jersey.

Carrots

In 1979, New York carrot growers planted about 2,000 acres. Carrots are not grown commercially in New Jersey. New York growers used 3,730 pounds (a.i.) of all pesticides in about 3,300 acre-treatments (Table 7). Excluded from these totals are an estimated 22,340 gallons of mineral spirits which were used to treat 444 acres. Mineral spirits control both broadleaf weeds and grasses.

Linuron and other herbicides were used for nearly 900 acre-treatments. Linuron was used for controlling broadleaf weeds such as pigweed, lambsquarters, ragweed, purslane, and Galinsota.

Parathion was used for about 95 percent of nearly 1,200 insecticide acre-treatments applied as single ingredient applications and was combined with maneb for about 85 percent of the tank-mix applications. Parathion was used primarily for controlling leaf hoppers, a vector of the carrot yellows disease.

Fungicides used alone are not an important practice. However, they are applied in tank-mixes with insecticides.

Table 7. Carrots: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New York, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Linuron	460	852	1.9	0.7	1.4	637
Other	-	61	-	.9	-	53
Total <u>d/</u>	-	913	-	.~	-	690
<u>Insecticides</u>						
Parathion	398	1,123	2.8	.6	1.7	658
Other	-	41	-	1.0	-	42
Total	-	1,164	-	.6	-	700
<u>Fungicides</u>						
Chlorothalonil	9	27	3.0	.9	2.6	23
Other	-	14	-	.9	-	13
Total	-	41	-	.9	-	36
<u>Tank mixtures</u>						
Carbaryl	40	200	5.0	.8	4.0	160
+ mancozeb				.5	2.4	96
Maneb	330	997	3.0	1.6	4.8	1,595
+ parathion				.4	1.3	440
Other	-	10	-	1.3	-	13
Total	-	1,207	-	1.9	-	2,304
TOTAL PESTICIDES	-	3,325	-	1.1	-	3,730

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 2,000 acres planted for the processing market (Table 2).

c/ Acres treated sums in this column not derived for "other" and "totals" because two or more materials may have been used on the same acre resulting in double counting.

d/ Excludes 22,340 gallons of mineral spirits used to spray 444 acres.

Celery

An estimated 600 acres of celery were planted during the summer and fall seasons in New York. Celery is not grown commercially in New Jersey. Approximately 32,000 pounds (a.i.) of all pesticides were used by New York growers in 22,000 acre-treatments (Table 8).

Nitrofen accounted for about 80 percent of the 3,800 acre-treatments of herbicides used in celery production. It was used for controlling redroot pigweed, lambsquarters, ragweed, and purslane.

Major insects affecting celery include tarnished plant bugs, aphids, imported cabbageworms, and cabbage loopers. In New York, demeton, methomyl and parathion were the major insecticides used, accounting for nearly 70 percent of the 10,600 insecticide acre-treatments. Demeton was used for control of aphids and imported cabbage worms, methomyl for cabbage loopers, and parathion for tarnished plant bugs. Azinphos-methyl and endosulfan were also important, accounting for about 15 and 10 percent, respectively, of the insecticide acre-treatments used by New York growers.

For early and late blight control, chlorothalonil accounted for nearly 45 percent of the 7,600 fungicide acre-treatments followed by anilazine with nearly 30 percent and benomyl with about 20 percent.

Cucumbers

In 1979, an estimated 2,900 acres of cucumbers were planted in the New York and 3,300 acres were planted in New Jersey. Only cucumbers grown in New Jersey for the processing market were included in the survey. These New Jersey growers accounted for about 25 percent of the two States' total cucumber acreage. To control weeds, insects, and diseases, approximately 11,000 pounds (a.i.) of all pesticides were used by New Jersey growers for about 3,500 acre-treatments (Table 9).

Table 8. Celery: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New York, 1979 a/ b/

	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre :		
	:treated	:treatments	: applied	:Per time	: Annual	:
Pesticides	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
CDEC	638	638	1.0	3.9	3.9	2,457
Nitrofen	704	3,054	4.3	.5	2.2	1,564
Other	-	89	-	1.1	-	97
Total	-	3,781	-	1.1	-	4,118
<u>Insecticides</u>						
Azinphos-methyl	426	1,699	4.0	.5	2.0	841
Demeton	624	2,148	3.4	.2	.8	525
Endosulfan	388	928	2.4	.7	1.8	680
Methom l	502	2,181	4.3	.2	.9	429
Parathion	627	2,703	4.3	.6	2.5	1,555
Ot'er	-	908	-	.4	-	323
Total	-	10,567	-	.4	-	4,353
<u>Fungicides</u>						
Benomyl	200	1,600	8.0	.5	4.0	800
Chlorothalonil	640	3,351	5.2	1.1	5.9	3,764
Anilazine	624	2,098	3.4	1.4	4.7	2,946
Maneb	79	551	7.0	1.6	11.2	887
Total	-	7,600	-	1.1	-	8,397
<u>Tank mixtures</u>						
Chloropicrin	56	56	1.0	40.5	40.5	2,250
+ D-D				229.5	229.5	12,749
Other	-	16	-	1.7	-	27
To' l	-	72	-	208.7	-	15,026
TOTAL PESTICIDES	-	22,020	-	1.4	-	31,894

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 600 acres planted for the Summer fresh market (Table 2).

c/ Acres treated sums in this column not derived for "other" and "totals" because two or more materials may have been used on the same acre resulting in double counting.

Table 9. Cucumbers: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New Jersey, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre :		
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Naptalam	133	133	1.0	2.6	2.6	344
Bensulide	168	168	1.0	2.8	2.8	477
Other	-	9	-	.8	-	7
Total	-	310	-	2.7	-	828
<u>Insecticides</u>						
Azinphos-methyl	101	168	1.7	.5	.8	85
Carbaryl	131	131	1.0	.7	.7	92
Endosulfan	259	535	2.1	.5	1.1	281
Other	-	22	-	.6	-	13
Total	-	856	-	.6	-	471
<u>Fungicides</u>						
Chlorothalonil	279	669	2.4	1.8	4.4	1,217
Mancozeb	101	134	1.3	2.0	2.7	268
Other	-	42	-	3.2	-	134
Total	-	845	-	1.9	-	1,619
<u>Tank mixtures</u>						
Naptalam	1,199	1,199	1.0	2.3	2.3	2,700
+ bensulide				4.2	4.2	4,986
Other	-	282	-	1.7	-	475
Total	-	1,481	-	5.5	-	8,161
TOTAL PESTICIDES	-	3,492	-	3.2	-	11,079

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 1,500 acres planted for the processing market; fresh market acreage not included in survey (Table 2).

c/ Acres treated sums in this column not derived for "other" and "totals" because two or more materials may have been used on the same acre resulting in double counting.

Bensulide and naptalam accounted for nearly all of the 300 single ingredient acre-treatments and about 80 percent of the 1,500 tank-mix acre-treatments. Bensulide was used for controlling grasses, and naptalam for controlling broad-leaf weeds.

Major insects affecting cucumbers in New Jersey were the cucumber beetles and squash vine borers. Endosulfan, azinphos-methyl, and carbaryl were used for their control at an application rate of 0.5 to 0.7 pounds (a.i.) per acre.

Anthrachnose and downy mildew were the principal diseases affecting cucumbers in New Jersey. Chlorothalonil and mancozeb were used in nearly 850 acre-treatments for their control.

Green peas

In 1979, an estimated 6,300 acres of green peas were planted by New York growers for the processing market. Nearly 5,000 acre-treatments of dinoseb and trifluralin were used as single ingredient applications (Table 10). Dinoseb was used for controlling broadleaf weeds such as pigweed, lambsquarter, ragweed and purslane. Trifluralin was used for controlling the same spectrum of grasses as indicated for cabbage.

None of the surveyed green pea growers reported using insecticides or fungicides.

Lettuce

An estimated 4,000 acres of lettuce were planted in New York and 3,500 acres were planted in New Jersey for harvest during 1979. Because of a shorter growing season, all of New York's acreage was planted for the summer market. A longer growing period allows New Jersey growers to plant for the spring, summer, and fall markets. For both States, about 50,000 acre-treatments were

Table 10. Green peas: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New York, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Dinoseb	2,903	2,903	1.0	1.5	1.5	4,215
Trifluralin	2,044	2,044	1.0	.5	.5	1,017
Other	-	7	-	1.8	-	12
Total	-	4,954	-	1.1	-	5,244
<u>Tank mixtures</u>						
Dinoseb	35	35	1.0	1.5	1.5	52
+ trifluralin				.3	.3	10
Total	-	35	-	1.8	-	62
TOTAL PESTICIDES	-	4,989	-	1.1	-	5,306

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 6,300 acres planted for the processing market (Table 2).

c/ Acres treated sums in this column not derived for "other" and "totals" because two or more materials may have been used on the same acre resulting in double counting.

used to apply nearly 70,000 pounds (a.i.) of all pesticides (Tables 11 and 12).

CDEC accounted for nearly 90 percent of the herbicide acre-treatments used on lettuce in New York and bensulide about 70 percent of the acre-treatments in New Jersey. CDEC was used for controlling both broadleaf weeds and grasses and bensulide was used mostly for controlling grasses.

Major insects affecting lettuce included leafhoppers, aphids, and loopers. Mevinphos was the major insecticide used by New York growers accounting for nearly 60 percent of the acre-treatments used as single ingredient applications. In New Jersey, methomyl accounted for about 60 percent of the acre-treatments. Other important insecticides used include diazinon and parathion in New York and Bacillus thuringiensis in New Jersey.

Disease problems affecting lettuce include downy mildew, lettuce mosaic, and yellows. Mosaic and yellows are kept in check by using insecticides to control their insect vectors. In New York, maneb accounted for about 60 percent of the nearly 2,000 fungicide acre-treatments applied as a single ingredient. Maneb was also tank-mixed with other fungicides in about 4,600 acre-treatments in New York and 10,000 acre-treatments in New Jersey.

Onions

In the Northeast, approximately 16,000 acres were planted for the fresh and processing markets, about 15,000 in New York and the remainder in New Jersey. For the two States, approximately 260,000 acre-treatments were used to apply nearly 610,000 pounds (a.i.) of all pesticides (Tables 13 and 14).

CDA and nitrofen were the major herbicides used by New York growers accounting for nearly 90 percent of the herbicide acre-treatments used in the State. CDA was applied as a preemergent herbicide for controlling both broadleaf weeds and grasses. Nitrofen was used for controlling broadleaf weeds such as pigweed, lambsquarters, purslane, and ragweed.

Table 11. Lettuce: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New York, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
CDEC	1,502	1,502	1.0	2.0	2.0	3,043
Pronamide	21	21	1.0	.9	.9	18
Other	-	205	-	2.5	-	513
Total	-	1,728	-	2.1	-	3,574
<u>Insecticides</u>						
Diazinon	550	1,242	2.3	.6	1.3	738
Dimethoate	136	504	3.7	.3	1.0	136
Parathion	542	1,608	3.0	1.1	3.3	1,814
Mevinphos	1,037	5,006	4.8	.9	4.5	4,650
Other d/	-	88	-	-	-	-
Total	-	8,448	-	.9	-	7,341
<u>Fungicides</u>						
Maneb	459	1,118	2.4	1.6	3.9	1,808
Other	-	863	-	1.6	-	1,377
Total	-	1,981	-	1.6	-	3,185
<u>Tank mixtures</u>						
Diazinon	859	4,295	5.0	.5	2.5	2,147
+ maneb				2.4	12.0	10,307
Other	-	260	-	1.6	-	424
Total	-	4,555	-	2.8	-	12,878
TOTAL PESTICIDES	-	16,712	-	1.6	-	26,978

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 4,000 acres were planted for the Summer fresh market (Table 2).

c/ Acres treated sums in this column not derived for "other" and "totals" because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

Table 12. Lettuce: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New Jersey, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	:	:	:	: Per acre :		
	:	:	:	:Per time : Annual :		
	:	:	:	:applied : average : Total		
	: Acres	: Acre-	: Times			
	:treated	:treatments	: applied			
	: c/	:	:			
<u>Single applications</u>						
<u>Herbicides</u>						
Bensulide	2,475	2,475	1.0	5.0	5.0	12,376
CDEC	359	368	1.0	3.0	3.1	1,102
Pronamide	674	674	1.0	1.4	1.4	966
Other	-	120	-	5.0	-	599
Total	-	3,637	-	4.1	-	15,043
<u>Insecticides</u>						
Acephate	417	913	2.2	.8	1.8	768
Bacillus						
<u>thuringiensis</u> <u>d/</u>	2,172	3,403	1.6	-	-	-
Methomyl	1,377	12,962	9.4	.5	4.3	5,868
Parathion	1,027	1,493	1.5	.4	.6	633
Mevinphos	771	986	1.3	.3	.3	250
Other	-	689	-	1.0	-	682
Total	-	20,446	-	.4	-	8,201
<u>Fungicides</u>						
Chlorothalonil	72	72	1.0	.9	.9	66
Other	-	384	-	.9	-	342
Total	-	456	-	.	-	408
<u>Tank mixtures</u>						
<u>Bacillus thuringiensis</u>						
+ fungicides						
+ insecticides	1,601	10,100	6.3	1.9	12.1	19,368
TOTAL PESTICIDES	-	34,639	-	1.2	-	43,020

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 3,500 acres planted for the fresh market: Spring - 1,700 acres, Summer - 700 acres, and Fall - 1,100 acres (Table 2).

c/ Acres treated sums in this column not derived for "other" and "totals" because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

Table 13. Onions: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New York, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
CDAA	12,622	26,446	2.1	7.1	14.8	186,998
Chloropropham	4,578	5,651	1.2	4.7	5.8	26,583
Nitrofen	10,265	22,958	2.2	.9	2.1	21,349
Other	-	425	-	7.5	-	3,208
Total	-	55,055	-	4.3	-	238,376
<u>Insecticides</u>						
Azinphos-methyl	806	2,910	3.6	.5	1.8	1,416
Diazinon	3,746	11,725	3.1	.6	1.8	6,692
Fonofos	3,659	3,659	1.0	1.6	1.6	5,988
Methyl parathion	749	3,235	4.3	.5	2.2	1,617
Parathion	9,502	37,982	4.0	.5	2.0	19,223
Other	-	803	-	.7	-	593
Total	-	60,314	-	.6	-	35,529
<u>Fungicides</u>						
Chlorothalonil	4,685	22,651	4.8	1.9	8.9	42,075
Anilazine	321	2,042	6.4	1.5	9.6	3,064
Maneb	5,041	11,011	2.2	2.2	4.8	24,430
Nabam	3,119	3,119	1.0	2.7	2.7	8,289
Mancozeb	554	2,853	5.1	2.2	11.3	6,258
Other	-	627	-	.3	-	157
Total	-	42,303	-	2.0	-	84,273
<u>Sprout control</u>						
Maleic hydrazide	8,657	8,657	1.0	1.5	1.5	13,405
<u>Tank mixtures</u>						
CDAA						
+ herbicides	7,596	9,978	1.3	11.5	15.1	114,817
Chlorothalonil	2,117	13,171	6.2	1.0	6.5	13,671
+ diazinon				.2	1.3	2,698
Chlorothalonil	2,548	19,861	7.8	.8	6.0	15,287
+ methyl parathion				.3	1.9	4,965
Chlorothalonil	1,511	12,484	8.3	.9	7.8	11,752
+ parathion				.3	2.7	4,063

-- continued

Table 13. Onions: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New York, 1979 a/ b/ --continued

	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre	:	:
	:treated	:treatments	: applied	:Per time	: Annual	:
Pesticides	: c/	:	:	:applied	: average	: Total
<u>Tank mixtures (cont'd)</u>						
Chlorothalonil						
+ herbicides						
+ insecticides						
+ other	2,646	3,818	1.4	3.0	4.3	11,430
Diazinon						
+ fungicides						
+ insecticides	1,727	13,761	8.0	.8	6.6	11,474
Maneb						
+ herbicides						
+ insecticides	1,560	4,669	3.0	2.8	8.4	13,079
Other	-	13,326	-	2.0	-	25,874
Total	-	91,068	-	2.5	-	229,110
TOTAL PESTICIDES	-	257,822	-	2.3	-	600,455

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 14,900 acres of fresh market onions were planted (Table 2).

c/ Acres treated sums in this column not derived for "other" and "totals" because two or more materials may have been used on the same acre resulting in double counting.

Table 14. Onions: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New Jersey, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
DCPA	858	873	1.0	5.7	5.8	5,010
<u>Insecticides</u>						
Diazinon	427	839	2.0	.6	1.1	482
Ethion	335	335	1.0	.9	.9	301
Malathion	312	509	1.6	1.8	3.0	932
Parathion	271	271	1.0	.2	.2	60
Other	-	33	-	2.3	-	73
Total	-	1,987	-	.9	-	1,848
<u>Fungicides</u>						
Chlorothalonil	332	535	1.6	1.1	1.8	603
Zineb	271	543	2.0	1.5	3.0	815
Total	-	1,078	-	1.3	-	1,418
TOTAL PESTICIDES	-	3,938	-	2.1	-	8,276

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 800 acres of fresh market onions were planted (Table 2).

c/ Acres treated sums in this column not derived for "other" and "totals" because two or more materials may have been used on the same acre resulting in double counting.

Onion maggots and thrips are the major insects affecting onions. Parathion was used for nearly 38,000 acre-treatments in New York or about 65 percent of the 60,000 insecticide acre-treatments applied as single ingredient applications. Other important insecticides in New York included diazinon, azinphos-methyl, fonofos, and methyl parathion. In New Jersey, diazinon accounted for about 40 percent and malathion about 25 percent of acre-treatments applied as single ingredient applications.

The major diseases affecting onions include leaf blight, smut, downy mildew, purple blotch and Alternaria leaf spot. In New York, chlorothalonil and maneb accounted for about 80 percent of the 42,000 acre-treatments of fungicides applied as single ingredient applications, and about the same percentage of the quantity applied. Other fungicides used by New York growers included anilazine, nabam, and mancozeb. New Jersey growers used chlorothalonil and zineb for about 1,000 acre-treatments.

New York growers indicated about 9,000 acre-treatments of malic hydrazide were applied to plants in the field to control onion sprouting during storage.

Tank-mix applications accounted for about 35 percent of the total 258,000 acre-treatments of all pesticides in New York. No tank-mixes were indicated by surveyed New Jersey growers.

Snap beans

In 1979, approximately 63,000 acres of snap beans were planted for the fresh and processing markets, about 56,000 acres in New York and 7,000 in New Jersey. However, only the processing snap bean acreage in New York was included in the 1979 Vegetable Pesticide Survey, about 49,200 acres. An estimated 76,000 acre-treatments were used to apply nearly 160,000 pounds (a.i.) of all pesticides (Table 15). Only one application was used for each of the herbicides, insecticides, and fungicides applied as single ingredients and as tank-mixes.

Table 15. Snap beans: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New York, 1979 a/ b/

	: Acres	: Acre-	: Times	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		
	: treated	: treatments	: applied	: Per time	: Annual	:
Pesticides	: c/	:	:	: applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Dinoseb	17,899	17,899	1.0	2.6	2.6	47,317
EPTC	24,157	24,157	1.0	3.2	3.2	76,219
Glyphosate	253	253	1.0	1.8	1.8	466
Trifluralin	13,528	13,528	1.0	.3	.3	4,547
Total	-	55,837	-	2.3	-	128,549
<u>Insecticides</u>						
Carbaryl	409	413	1.0	.8	.9	351
Disulfoton	2,247	2,247	1.0	1.8	1.8	3,966
Parathion	1,073	1,073	1.0	.5	.5	531
Other	-	481	-	1.1	-	538
Total	-	4,214	-	1.3	-	5,386
<u>Fungicides</u>						
Benomyl	9,336	9,336	1.0	.6	.6	5,303
Other	-	381	-	.2	-	77
Total	-	9,717	-	.6	-	5,380
<u>Tank mixtures</u>						
EPTC	5,124	5,632	1.1	3.2	3.5	17,946
+ trifluralin				.4	.4	2,230
Other	-	127	-	3.0	-	381
Total	-	5,759	-	3.6	-	20,557
TOTAL PESTICIDES	-	75,527	-	2.1	-	159,872

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 49,200 acres planted for the processing market; fresh market acreage not included in survey (Table 2).

c/ Acres treated sums in this column not derived for "other" and "totals" because two or more materials may have been used on the same acre resulting in double counting.

EPTC, dinoseb, and trifluralin accounted for nearly 100 percent of the 56,000 herbicide acre-treatments applied as single ingredients. EPTC + trifluralin also accounted for nearly all of the approximately 5,800 tank-mix applications. Rate per application ranged from 3.2 pounds (a.i.) per acre for EPTC to 0.3 pounds for trifluralin. EPTC and trifluralin were used for controlling grasses such as foxtail, barnyardgrass, crabgrass, and yellow nutsedge. Dinoseb was used for controlling broadleaf weeds such as pigweed, lambsquarters, ragweed, and purslane.

Major insect pests affecting snap beans include leafhoppers, bean beetles, aphids, and mites. To control these pests, disulfoton was used for about 55 percent of the insecticide acre-treatments and parathion for 25 percent of the acre-treatments.

Sclerotinia white mold is the primary disease affecting snap beans. Benomyl accounted for about 95 percent of fungicide acre-treatments used for controlling mold.

Sweet corn

In 1979, New York growers planted about 44,000 acres of sweet corn, with market intentions about equally divided between the processing and fresh markets. New Jersey planted about 11,800 acres for the fresh market only. For both States, approximately 120,000 acre-treatments were used to apply nearly 210,000 pounds (a.i.) of all pesticides (Tables 16 and 17).

Atrazine accounted for nearly 80 percent of the total 19,000 single ingredient herbicide acre-treatments in New York and 50 percent of the 4,800 acre-treatments used in New Jersey. Atrazine was used for controlling broadleaf weeds, quackgrass, and nutsedge.

Major insect pests affecting sweet corn include corn borers, corn earworms, and armyworms. In New York, methomyl, EPN and methyl parathion accounted for

Table 16. Sweet corn: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New York, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre :		
	:treated	:treatments:	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Alachlor	1,406	2,406	1.0	1.9	1.9	2,636
Atrazine	12,657	14,969	1.2	1.0	1.2	15,510
Butylate	442	442	1.0	2.4	2.4	1,044
Cyanazine	642	642	1.0	1.8	1.8	1,177
EPTC	245	245	1.0	2.2	2.2	528
Glyphosate	935	935	1.0	2.4	2.4	2,254
2,4-D	345	345	1.0	.4	.4	143
Other	-	131	-	.6	-	84
Total	-	19,115	-	1.2	-	23,376
<u>Insecticides</u>						
Carbaryl	1,738	5,407	3.1	1.3	4.1	7,128
EPN	12,432	17,589	1.4	.1	.2	1,941
Methomyl	10,518	20,535	2.0	.5	1.0	10,479
Methyl parathion	10,423	15,203	1.5	.6	.9	8,927
Parathion	1,898	4,717	2.5	.7	1.8	3,429
Other	-	560	-	.8	-	454
Total	-	64,011	-	.5	-	32,358
<u>Fungicides</u>						
Chlorothalonil	25	25	1.0	1.5	1.5	37
Maneb	3	21	7.0	1.6	11.2	34
Total	-	46	-	1.5	-	71
<u>Tank mixtures</u>						
Atrazine	1,612	1,612	1.0	.9	.9	1,486
+ cyanazine				1.1	1.1	1,705
Atrazine	5,371	5,608	1.0	1.0	1.1	5,671
+ alachlor				1.8	1.8	9,911
Atrazine	2,986	2,986	1.0	.8	.8	2,534
+ butylate				3.3	3.3	9,817
Atrazine	161	161	1.0	1.0	1.0	161
+ 2,4-D				.1	.1	31

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Table 16. Sweet corn: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New York, 1979 a/ b/ --continued

	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre :		
	:treated	:treatments:	: applied	:Per time	: Annual	:
Pesticides	: c/	:	:	:applied	: average	: Total
<u>Tank mixtures</u>						
Atrazine						
+ herbicides	360	360	1.0	9.5	9.5	3,437
Bladex						
+ herbicides	388	388	1.0	5.7	5.7	2,194
Other	-	925	-	1.8	-	1,674
Total	-	12,040	-	3.2	-	38,621
TOTAL PESTICIDES	-	95,212	-	1.0	-	94,426

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 44,300 acres planted: 21,600 for the processing market and 22,700 for the Summer fresh market (Table 2).

c/ Acres treated sums in this column not derived for "other" and "totals" because two or more materials may have been used on the same acre resulting in double counting.

Table 17. Sweet corn: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New Jersey, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments:	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Atrazine	2,171	2,171	1.0	1.5	1.5	3,157
Alachlor	1,801	1,801	1.0	1.1	1.1	2,062
Butylate	542	542	1.0	6.7	6.7	3,633
Other	-	238	-	.3	-	69
Total	-	4,752	-	1.9	-	8,921
<u>Insecticides</u>						
Carbaryl	1,544	3,880	2.5	1.4	3.5	5,389
Methomyl	6,359	25,738	4.0	.8	3.0	19,386
Malathion	211	757	3.6	.4	1.4	292
Methyl parathion	769	2,568	3.3	.7	2.4	1,848
Parathion	3,077	8,765	2.8	.5	1.4	4,450
Other	-	927	-	.6	-	523
Total	-	42,635	-	.7	-	31,888
<u>Fungicides</u>						
Chlorothalonil	7	15	2.1	1.9	3.8	27
Total	-	15	-	1.8	-	27
<u>Tank mixtures</u>						
Carbaryl	2,682	16,942	6.3	1.5	9.2	24,782
+ parathion				.3	1.8	4,876
Methomyl	434	1,302	3.0	.4	1.4	586
+ parathion				.1	.3	130
Other	-	5,751	-	1.8	-	10,146
Total	-	23,995	-	1.7	-	40,520
TOTAL PESTICIDES	-	71,397	-	1.1	-	81,356

- a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.
- b/ In 1979, 11,800 acres planted for the Summer fresh market (Table 2).
- c/ Acres treated sums in this column not derived for "other" and "totals" because two or more materials may have been used on the same acre resulting in double counting.

about 85 percent of the insecticide acre-treatments and 65 percent of the pounds (a.i.) applied. In New Jersey, sweet corn growers used methomyl for about 60 percent of the total insecticide acre-treatments and about the same percentage of the total quantity applied.

Compared with insect control, diseases present a minor problem for sweet corn growers. It is not economically feasible to control smut, the most common disease problem. Less than 50 acre-treatments of chlorothalonil and maneb were used in either State for controlling leaf blights or rusts.

Tomatoes

An estimated 17,600 acres of tomatoes were planted in the Northeast region with about 60 percent and 40 percent of the production intended for the respective fresh and processing markets. Nearly all of the tomatoes grown in New York and about 30 percent of the tomatoes grown in New Jersey are planted for the fresh market. For both States, nearly 154,000 pounds (a.i.) of all pesticides were used for about 125,000 acre-treatments (Tables 18 and 19).

Trifluralin accounted for about 90 percent of the total herbicide acre-treatments applied as single ingredients in New York and nearly 80 percent of the total acre-treatments in New Jersey. It was used for controlling barnyard-grass, crabgrass, foxtail, and pigweed.

Major insects affecting tomatoes include aphids, Colorado potato beetles, flea beetles, tomato fruitworms, tomato hornworms, and European corn borers. New York growers used endosulfan and parathion for about 75 percent of the insecticide acre-treatments. Growers in New Jersey used azinphos-methyl for about 55 percent of the acre-treatments.

Chlorothalonil and captafol comprised 80 to 90 percent of the fungicides used by New York and New Jersey growers for controlling early and late blights,

Table 18. Tomatoes: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New York, 1979 a/ b/

	: Acres : treated : c/	: Acre- : treatments :	: Times : applied :	:Pounds of active ingredient : Per acre : Per time : Annual : applied : average : Total		
Pesticides						
Single applications						
Herbicides						
Trifluralin	2,133	2,133	1.0	.5	.5	1,033
Other	-	217	-	1.1	-	243
Total	-	2,350	-	.5	-	1,276
Insecticides						
Azinphos-methyl	443	515	1.2	.3	.4	166
Carbaryl	216	731	3.4	1.2	4.1	876
Diazinon	569	1,104	1.9	.5	1.0	558
Endosulfan	959	4,016	4.2	.8	3.3	3,166
Parathion	1,555	3,148	2.0	.4	.9	1,333
Other	-	255	-	.5	-	136
Total	-	9,769	-	.6	-	6,235
Fungicides						
Chlorothalonil	2,410	9,874	4.1	1.0	4.0	9,681
Captafol	412	1,081	2.6	1.7	4.4	1,831
Maneb	284	939	3.3	1.8	5.9	1,661
Other	-	379	-	.9	-	353
Total	-	12,273	-	1.1	-	13,526
Tank mixtures						
Pebulate	327	327	1.0	.2	.2	74
+ trifluralin				.5	.5	163
Chlorothalonil	327	327	1.0	.9	.9	297
+ diazinon				.5	.5	163
Chlorothalonil	327	1,960	6.0	.9	5.5	1,782
+ endosulfan				.5	3.0	980
Other	-	482	-	2.0	-	969
Total	-	3,096	-	1.4	-	4,428
TOTAL PESTICIDES	-	27,488	-	.9	-	25,465

a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 7,000 acres planted for the Summer fresh market (Table 2).

c/ Acres treated sums in this column not derived for "other" and "totals" because two or more materials may have been used on the same acre resulting in double counting.

Table 19. Tomatoes: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New Jersey, 1979 a/ b/

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Diphenamid	503	503	1.0	2.8	2.8	1,413
Metribuzin	461	461	1.0	.3	.3	140
Pebulate	384	384	1.0	.1	.1	49
Trifluralin	6,519	6,519	1.0	.8	.8	5,487
Other	-	434	-	1.8	-	802
Total	-	8,301	-	1.0	-	7,891
<u>Insecticides</u>						
Azinphos-methyl	4,301	15,349	3.6	.5	1.9	8,033
<u>Bacillus</u>						
thuringiensis d/	542	542	1.0	-	-	-
Carbaryl	648	1,618	2.5	1.0	2.4	1,548
Oxamyl	2,008	6,143	3.1	.4	1.4	2,710
Parathion	677	848	1.3	.6	.8	546
Phosphamidon	822	1,244	1.5	.6	.9	721
Other	-	1,284	-	.6	-	827
Total	-	27,028	-	.5	-	14,385
<u>Fungicides</u>						
Chlorothalonil	2,040	9,860	4.8	1.5	7.3	14,897
Captafol	2,874	11,025	3.8	1.8	6.8	19,528
Maneb	877	2,370	2.7	2.6	6.9	6,053
Mancozeb	761	2,669	3.5	1.9	6.8	5,187
Other	-	807	-	1.3	-	1,080
Total	-	26,731	-	1.7	-	46,745
<u>Growth regulators</u>						
Ethephon	880	880	1.0	1.2	1.2	1,086
<u>Tank mixtures</u>						
Azinphos-methyl	1,349	2,740	2.0	.5	1.0	1,306
+ chlorothalonil				.9	1.8	2,491
Azinphos-methyl	919	3,295	3.6	.3	.9	823
+ chlorothalonil				1.0	3.4	3,143
+ oxamyl				.3	.9	824
Azinphos-methyl	426	1,277	3.0	.5	1.5	632
+ captafol				1.8	5.3	2,242
+ oxamyl				.5	1.5	639
Azinphos-methyl	1,810	11,797	6.5	.5	3.2	5,864
+ endosulfan				.8	4.9	8,845

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Table 19. Tomatoes: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, New Jersey, 1979 a/ b/ -- continued

Pesticides	:	:	:	:Pounds of active ingredient		
	: Acres	: Acre-	: Times	: Per acre		:
	:treated	:treatments	: applied	:Per time	: Annual	:
	: c/	:	:	:applied	: average	: Total
<u>Tank mixtures (cont'd)</u>						
Azinphos-methyl	594	1,188	2.0	.4	.8	446
+ endosulfan				.8	1.6	950
+ maneb				2.4	4.8	2,851
Azinphos-methyl	475	1,144	2.4	.6	1.3	639
+ oxamyl				.5	1.2	572
Azinphos-methyl						
+ fungicides						
+ insecticides	2,916	4,713	1.6	2.2	3.5	10,327
Captafol						
+ insecticides	469	469	1.0	2.6	2.6	1,226
Chlorothalonil						
+ insecticides						
+ fungicides	1,520	5,395	3.5	1.8	6.5	9,879
Copper hydroxide						
+ insecticides						
+ fungicides	481	669	1.4	2.5	3.5	1,681
Maneb	78	470	6.0	1.7	10.3	805
+ oxamyl				.5	3.0	235
Oxamyl						
+ fungicides	173	587	3.4	1.7	5.9	1,022
Other	-	480	-	1.6	-	788
Total	-	34,224	-	1.7	-	58,230
TOTAL PESTICIDES	-	97,164	-	1.3	-	128,337

- a/ 1979 Vegetable Pesticide Survey, Natural Resource Economics Division, ESCS, USDA.
- b/ In 1979, 10,600 acres planted: 7,300 for the processing market and 3,300 for the Summer fresh market (Table 2).
- c/ Acres treated sums in this column not derived for "other" and "totals" because two or more materials may have been used on the same acre resulting in double counting.
- d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

blemish, anthracnose, and common leaf spot.

Tank-mix applications accounted for about 10 percent of all applications in New York and 35 percent in New Jersey. Tank-mix applications using azinphos-methyl plus other pesticides accounted for about 75 percent of the tank-mix applications.

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